1081.39543X00

OP00104USLEES(1)

SUBSTITUTE SPECIFICATION

Title of the Invention

Transmit-Receive Switching Circuit and Method of Wireless Communication System

Background of the Invention

Field of the Invention

[0001] The invention relates to providing a wireless communication system, and particularly, to providing a transmit-receive switching circuit and method for alternatively switching a transmit-receive frequency into a corresponding transmit-receive channel.

[0002] In other words, the transmit-receive switching operation is performed so that as a master transmits a frequency from an upper channel thereof for communication, a slave receives the frequency into an upper channel thereof and transmits another frequency from a lower channel thereof, while the master receives from a lower channel thereof, in which the transmit-receive frequencies are switched into different channels which do not intervene each other.

[0003] Herein, it is noted that the wireless communication system generally means "Mobile Radio Equipment" divided into a master and a slave.

Description of the Prior Art

[0004] In general, a wireless communication system uses FRS of a mobile radio communication, for which a communication frequency is first set between a master and a slave. The master transmits predetermined information to the slave. The slave switches from receive mode into transmit mode in order to transmit information in response to the information from the master and the master switches from transmit mode into receive mode so as to receive information in response to the information from the slave.

[0005] If simultaneous communication occurs between the master and the slave, the master is always set to place a transmit channel in an upper band and a receive channel in a lower band, while the slave is adjusted to place a transmit channel in a lower band and a receive channel in an upper band. The communication system uses a half-duplex communication method with the same frequency, because the transmit-receive frequency band is fixed.

[0006] The communication method and system has problems in that it is inconvenient for users to switch a system into a predetermined mode upon every transmit-receive operating for the communication and to use the fixed transmit-receive frequency for a full-duplex communication between the master and the slave.

[0007] Accordingly, in order to resolve the problems and disadvantages described above, the invention provides a transmit-receive switching circuit and method of a wireless communication system for alternatively switching a transmit-receive frequency into a corresponding transmit-receive channel.

[0008] The other object of the invention is to provide a transmit-receive switching circuit and method of a wireless communication system for preventing the intervention at a frequency channel between a master and a slave to enable the simultaneous communication.

SUMMARY OF THE INVENTION

[0009] In order to accomplish the above function, a transmit-receive switching circuit of a wireless communication system in accordance with the invention comprises a selecting portion for switching the communication system in a waiting mode into a master; a controller for determining a transmit-receive frequency according to the operating of the selecting portion and generating a control signal; a band selecting portion for selecting an inputting signal of an upper band or a lower band of a receiving signal passed through an antenna and a duplex according to the control signal of the controller; a first switching portion for selecting an upper band pass filter and a lower band pass filter that are operated by the band selecting portion; an amplifying portion for amplifying a receive signal passing through the switching portion; a second switching portion for switching the receive signal amplified at the amplifying portion according to the operating signal of the band selecting portion and determining to be supplied to an upper band filter or a lower band pass filter of a second filtering portion; a mixer for mixing the receive signal passing through the second filter with a local oscillating frequency from a local oscillator; a filtering portion for filtering an intermediate frequency from the mixed frequency; and a

transmit mode determining portion for determining/transmitting a transmit frequency according to a signal outputted from the band selecting portion.

[0010] A transmit-receive switching method comprises steps of setting a receiving channel at an upper channel and a transmit channel at a lower channel upon the operating of a communication system and switching the communication system into a waiting mode; judging whether the communication system is a master to try the communication; switching the transmit-receive channel, automatically, to place the transmit channel on the upper band and the receive channel on the lower band, firstly, if it is determined as the master; performing the transmit-receive operating at a state determined by the first transmit-receive channel switching step; judging whether the transmit-receive operating is finished and switching the transmit-receive mode into the waiting mode if finished; judging whether the communication system is a slave, if the communication system is not the master at the judging step; and switching the transmit-receive channel, automatically, to place the transmit channel on the upper band and the receive channel on the lower band, secondly, if it is determined as the slave.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The invention now ill be described in detail with reference to the accompanying drawings, in which:

[0012] Fig. I is a view illustrating a transmit-receive switching circuit of a wireless communication system according to the invention; and

[0013] Fig. 2 is a flow chart illustrating the operating of a transmit-receive switching circuit of a wireless communication system according to the invention.

DETAILED DESCRIPTION OF THE IIINVENTION

[0014] Referring to Fig. 1, a controller 20 is connected to a selecting portion 10 to determine a transmit-receive frequency according to the selection of the selecting portion 10, which converts a communication system in a waiting mode into a master and outputs a control signal. A band-selecting portion 30 outputs an operating signal for selecting an upper channel and a lower channel according to the control signal from the controller 20.

[0015] A first switching portion 45 includes an analog switch that is switched according to the operating signal from the band selecting portion 30 and for determining whether a receive signal passing through an antenna and a duplex portion is supplied to an upper band pass filter or a lower band pass filter of a first filtering portion 50. A second switching portion 60 is switched according to the operating signal of the band-selecting portion 30 to supply a signal filtered by the first filtering portion 50 and then amplified by an amplifying portion 55 and applied to an upper filter or a lower filter of a second filtering portion 65. Herein, if the master is operated to transmit using the lower band and receive using the upper band, only the upper filters of the first and second filtering portions 50 and 65 are operated to permit a predetermined frequency, for example a frequency of 449.1375MHz to be passed there through, while the lower filters becomes inactive and doesn't permit the predetermined frequency

of for example 449.1375MHz to not be passed. If the slave is operated to transmit a predetermined frequency using lower bands and to receive a predetermined frequency using upper bands, in which the transmitting frequency is for example 424.1375MHz and the receiving frequency is 424.1375MHz. That is, the transmitting frequency is not allowed to pass through first and second filtering portions 50 and 65, and only the receiving frequency is passed through the first and second filtering portion.

[0016] A mixer 75 mixes the received signal from the second filtering portion 65 with a local oscillator frequency from a local oscillator 70. An intermediate frequency filtering portion 77 filters an intermediate frequency signal from the mixed frequency. A demodulating portion 80 demodulates the intermediate frequency from the mixer 75 and outputs a demodulated signal. A transmit mode determining portion 90 determines a transmit frequency according to the signal from the band selecting portion 30 and enables the transmit frequency to be amplified passing through a transmit output amplifying portion 95 and then passed through the duplex portion 40 and the antenna in order, thereby transmitting a predetermined frequency to another communication system.

[0017] The operation of the transmit-receive switching circuit as described above now will be described in detail with reference to the flow chart of Fig. 2.

[0018] Since a wireless communication system provided with the transmitting-receiving switching circuit according to the invention is operated with a power source being applied thereto, the system is switched into a waiting mode as step S1. Step S1 proceeds to step S2 at which the controller 20

judges whether the selecting portion 10 is operating or not. In other words, assuming that the communication system is a master, the controller 20 forces the transmit mode determining portion 90 to determine a transmitting frequency such as 449.1375MHz and supply the transmitting frequency through the transmit output amplifying portion 95 to the antenna, while outputting a control signal to the band selecting portion 30 to convert a receiving signal into a frequency such as 449.1375MHz, in which the band selecting portion 30 applies a control signal to the control terminals of the first and second switching portion 45 and 60, so that their input terminals are connected to selected output terminals. Therefore, a transmitting channel is placed on the upper channel of the filtering portion 50 and a receiving channel is placed on the lower channel of the filtering portion 50, and a receive signal passes through the antenna and the duplex portion 40 and then is filtered at the lower channel, and vice versa.

[0019] After the switching of the transmit-receive channel, step S2 goes to step S3 at which judgment occurs whether the communication system is a master. If so, step S3 proceeds to step S4 at which the transmitting-receiving channels are respectively fixed on the upper channel and the lower channel. At step S5, the communication system becomes the master to perform the transmitting-receiving operation with the slave. Step S5 goes to step S6 at which judgment occurs whether the transmitting-receiving operation is finished. If the controller 20 identifies the operating of the selecting portion 10, for example the selecting portion 10 returns to the original position or receives an inputting signal such as a communication suspension from outside, step S6

proceeds to step S7 at which the communication system is set in a waiting mode for the transmitting-receiving operation.

[0020] On the other hand, if it is judged that the communication system is not the master at step S2, step S2 goes to step S8 at which judgment occurs whether the communication system is in a receiving mode. If the communication system is being switched into the receive mode, step S8 goes to step S9 at which the transmitting channel is switched into the upper channel of the first filtering portion 50 and the receiving channel is switched into the lower channel of the first filtering portion 50.

[0021] As described above, a master which transmits or a slave which receives the communications is automatically switched into their designated transmitting-receiving channels to prevent the intervention of the transmitting-receiving frequencies with each other at the frequency channel.